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(19) (CA) **CANADIAN PATENT** (12)

(54) Detector Base

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ABSTRACT OF THE DISCLOSURE

A detector base which is installed on a ceiling prior to mounting a fire alarm on the ceiling has a base block for mounting a detector, the base block including an opening which is located outside of the periphery of the detector when the detector is mounted; a locking spring having one end secured to the base block and the other end being a free end, the spring being placed in a position facing outwards via the opening; and engaging means provided for a movable portion of the locking spring and being engaged with the detector.

Another detector base has a base block for mounting a detector; a pair of connecting terminals having the same polarity fixed on the base block so as to be located spaced apart from each other and the pair of connecting terminals having small holes, respectively; and a short-circuiting device for electrically connecting the both pair of connecting terminals by inserting both ends of the short-circuiting device into the small holes formed on the pair of the connecting terminals such that they can be detached from each other, respectively. Unauthorized removal of the fire alarm is prevented.

The present invention relates to a detector base which is installed to a ceiling in advance for mounting a fire detector on the ceiling of a room.

5 In order to prevent such unauthorized removal of a fire detector from its base as done by mischief or the like, the known fire detector is provided with a bayonet coupling means to put the detector unit and the base together and a locking means to maintain the detector in coupled state. The locking means is designed as follows. A portion of the base block of the detector base is cut and a movable tongue is arranged in the notch in such a manner that it can be touched and swung while the fire detector is mounted on the base. A recess formed at the bottom of the fire detector is engaged with a locking projection provided on the movable tongue.

10 A portion of the base block of the detector base, the height of which is reduced from the aesthetic view point, is cut and the movable tongue is arranged in the notch, and swings along its thickness. Therefore, it is difficult to sufficiently widen the swinging range of the movable tongue, and accordingly, the swinging range of the locking projection of the moving



tongue is small, thus weakening the engagement between the locking projection of the moving tongue and the recess formed at the bottom of the fire detector. As a result, only a light touch on the movable tongue is sufficient to release the engagement and the fire detector is easily removed from the base deliberately by mischief or the like.

Also, another type of known detector base sends information to a receiver or a transmitter when a fire detector is removed from its base. To such a detector base, a pair of lines, each of which serves both as a power and a signal line, extending from a receiver or a transmitter are connected. When the fire detector is removed from the base deliberately by mischief or the like, the fire detector disconnects one of the pair of lines and thereby informs the receiver or the transmitter in the form of a disconnect signal that the fire detector has been removed.

In this type of a detector base, one of the pair of lines is cut half way and its one end is connected to a first connecting terminal of the base while the other end to a second connecting terminal of the base. When the fire detector is correctly mounted on the base, the first and second connecting terminals of the base is shorted by means of a jumper wire arranged within the fire detector. Hence, when the fire detector is removed from the base, the first and second connecting terminals are disconnected therebetween.

5 In such a detector base, in order to inspect whether or
not the base is correctly connected to a pair of lines which
serve both as power and signal lines during the installation
work of the detector base to the ceiling of a room, it is
necessary to mount the fire detector on the base and short
between the first and second connecting terminals. However,
if the fire detector is mounted on the base for that purpose,
the fire detector might possibly be damaged in the work
afterwards. Therefore, a jumper wire is screwed between the
10 first and second connecting terminals. This is extremely
time-consuming work such as screwing a short-circuiting wire
for the purpose of the inspection and unscrewing the wire
after the inspection in order to mount the fire detector on
the base.

15 The present invention provides a detector base which can
prevent a mounted fire detector from being easily removed by
mischief or the like. The present invention also provides a
detector base in which it is easy to check whether or not the
20 base is correctly connected to the power and signal lines
even during the installation work thereof on the ceiling of a
room.

25 More particularly, according to a first aspect of the
present invention, there is provided a detector base
comprising a base block for attaching a detector, the base

block including an opening which is located outside of the periphery of the detector when the detector is attached; a locking spring having one end secured to the base block and the other end being a free end, the spring being placed in a position facing outwards via the opening; and engaging means provided for a movable portion of the locking spring and being engaged with the detector.

Furthermore, according to a second aspect of the present invention, there is provided a detector base comprising a base block for mounting a detector; a pair of connecting terminals having the same polarity fixed on the base block so that they are located spaced apart from each other and the pair of connecting terminals having small holes, respectively; and short-circuiting means for electrically connecting the both pair of connecting terminals by inserting both ends of the short-circuiting means into the small holes formed on the pair of the connecting terminals in such a manner they can be detached from each other, respectively.

Aspects of the invention will be described in more detail by reference to the accompanying drawings, in which:

Figs. 1 - 3 are a perspective view, a top view and a bottom view, respectively, of a detector base of an embodiment according to the present invention;

Fig. 4 is a sectional view taken on line IV - IV shown

in Fig. 2;

Fig. 5 is a sectional view of a principal portion of the embodiment;

Fig. 6 is a view showing a curved spring for a jumper wire used in the embodiment;

Figs. 7 and 8 are a front view and a plan view, respectively, showing a fire detector which is to be mounted on a base of the embodiment;

Fig. 9 is a front view showing an assembly of the fire detector and the base of the embodiment;

Fig. 10 is a sectional view taken on line X - X shown in Fig. 9; and

Fig. 11 is a sectional view showing a principal portion when the fire detector is attached to the base of another embodiment.

An embodiment of the present invention will be described with reference to the accompanying drawings.

As shown in Figs. 1 - 3, an elongated hole 2 is provided radially on a circular base block 1. A spring 3 is fixed to one end 2a of the elongated hole 2 positioned in the center side of the base block 1. As illustrated in Fig. 4, the spring 3 has a vertical piece 3a which is raised from the one end 2a of the elongated hole 2 on the base block 1 and a

horizontal piece 3b having one end connected to the vertical piece 3a and the other end which is a free end 3c. The horizontal piece 3b is provided substantially in parallel with the elongated hole 2. The free end 3c of the horizontal piece 3b and the other end 2b of the elongated hole 2 are arranged such that they are positioned at the outside of a peripheral portion 4a of a fire detector 4 when the fire detector 4 is attached onto the base block 1. More specifically, the free end 3c of the spring 3 faces the outside from this detector base through a part of the elongated hole 2 when the fire detector is attached. An engaging portion 6 prismatically protruding downwards is formed substantially in the middle part of the horizontal piece 3b.

Connecting terminals 7 and 8 having the same polarity are respectively fixed circumferentially on the base block 1 so as to be spaced apart from each other. As shown in Fig. 5, a small hole 7a is formed in the connecting terminal 7. Likewise, a small hole 8a is formed in the connecting terminal 8. Screws 14 and 15 are provided for these connecting terminals 7 and 8, respectively. One of a pair of lines which serve both as power and signal lines extending from a receiver or a transmitter (not shown) is cut half way and its one end is connected to the connecting terminal 7 by the screw 14 while the other end to the connecting terminal 8 by the screw 15.

As illustrated in Fig. 6, a curved spring 10 for a

jumper wire has a main portion of the length B with bends 11 and 12 at both ends. Furthermore, snaps 11a and 12a are formed in the bends 11 and 12 so that the bends 11 and 12 are firmly engaged with the small holes 7a and 8a of the connecting terminals 7 and 8 when the former are inserted into the latter. As shown in Fig. 2, the length B of the main portion of the spring 10 is adapted to be slightly longer than the straight distance A between the small hole 7a of the connecting terminal 7 and the small hole 8a of the connecting terminal 8. Thus, when the bends 11 and 12 are inserted into the small holes 7a and 8a, respectively, the curved spring 10 for a jump wire bends somewhat.

As shown in Fig. 2, another connecting terminal 9 is also arranged on the base block 1 in such a manner that it is positioned apart from connecting terminals 7 and 8.

A description will be given with regard to the procedure to be followed when a fire detector is mounted on a detector base in this embodiment. First, a fire detector 4 to be mounted on the base is shown in Figs. 7 and 8. Fixed to the fire detector 4 are connecting terminals 17, 18 and 19 which are, respectively, bayonet-fitted to the connecting terminals 7, 8 and 9 of the detector base. Also, in the fire detector 4, an engaging portion 5 is formed at a portion corresponding to the engaging portion 6 of the spring 3 on the base. As illustrated in Fig. 10, the engaging portion 5 includes a recess 5b into

which the engaging portion 6 of the spring 3 on the base is inserted and a projection 5a formed at the edge of the recess 5b.

It will be assumed that a detector base shown in Fig. 1 is fixed on the ceiling in a room in advance. The fire detector 4 is overlapped with the base block 1, and in that condition the fire detector 4 is rotated at a predetermined angle counterclockwise as indicated by arrow A4 in Fig. 8, thereby bayonet-fitting the connecting terminals 7, 8 and 9 of the base to the connecting terminals 17, 18 and 19 of the fire detector 4. Thus, the fire detector 4 is mounted on the base as illustrated in Fig. 9.

As shown in Fig. 10, when the fire detector 4 is mounted on the base, the engaging portion 6 of the spring 3 on the base passes through the projection 5a of the fire detector 4 and is engaged within the recess 5b firmly and deeply, due to the elasticity of the spring 3 downwards as indicated by arrow A6, thereby locking the bayonet-fitting.

On the other hand, as indicated in Fig. 4, in the procedure when the fire detector 4 is removed from the base 1, pressure is applied to the free end 3c of the spring 3 upwards as indicated by arrow A3, against the elasticity of the spring 3 by using a narrow bar or the like via a part of the elongated hole 2 formed on the base block 1 which is exposed outwards from the periphery of the fire detector 4. The spring 3 is deformed

to such a degree that the free end 3c rises up to substantially the same level as height y of the vertical piece 3a. Hence, the engaging portion 6 formed on the spring 3 and the engaging portion 5 of the fire detector 4 are completely disengaged to release the locking. In this condition, the fire detector 4 is rotated at a predetermined angle in the opposite direction of arrow A4 in Fig. 10 in the horizontal plane, thereby releasing the bayonet-fitting between the connecting terminals 7, 8 and 9 of the base and the connecting terminals 17, 18 and 19 of the fire detector 4.

A stopper 16 is formed near the spring 3 on the base block 1 and therefore the spring 3 is protected from such damage that might be caused by excessive turning.

Whether or not the detector base is correctly connected to a pair of lines, each of which serves both as a power and a signal line, extending from the receiver or the transmitter can be inspected during the installation work by the following method. The bends 11 and 12 of the curved spring 10 for a short-circuit are fitted into the small holes 7a and 8a of the connecting terminals 7 and 8 of the base, respectively, thereby electrically shorting between the connecting terminals 7 and 8. The curved spring 10 is held securely due to its elasticity and cannot be released easily by vibration or the like. Hence, an inspection can be performed without mounting the fire detector 4 on the base. Moreover, troublesome works,

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such as connecting a line between these connecting terminals 7 and 8 by utilizing the screws 14 and 15, are not necessary.

After the inspection, an inspector fastens a hook, which he carries with him in advance, on the spring 10 and pulls it downwards, thereby removing the spring 10 from the base. Afterwards, the fire detector 4 is mounted on the base as described above.

While the present invention has been described in its preferred embodiments with reference to the accompanying drawings, it is to be understood that the invention is not limited to the preferred embodiments shown in the drawings. Partial modification of the construction and addition thereto can also be made to the invention without departing from the scope of the invention.

For example, as illustrated in Fig. 11, an engaging portion of a base 21 may be constructed of a recess 6a formed on the horizontal piece 3b of the spring 3 and an engaging portion of a fire detector 24 may be formed of a projection 5c which is inserted into the recess 6a.

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THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A fire detector comprising:

a detector unit having an outermost peripheral wall, an engaging portion located inwardly of said outermost peripheral wall, and connecting members of a bayonet coupling; and

a detector base including a base block to which said detector unit is mounted, said base block having a peripheral portion protruding radially outwardly to a location outside of said outermost peripheral wall of the detector unit and said base block defining an opening in said peripheral portion, at least a part of said opening in said peripheral portion being located outside of said outermost peripheral wall of the detector unit, a locking spring having one end integral with said base block at a location inside of said outermost peripheral wall of the detector unit, a free end located outside of said outermost peripheral wall of the detector unit and within said at least a part of said opening, a piece extending from said one end to said free end, and an engaging portion extending from said piece in a direction away from said base block and engaged with said engaging portion of the detector unit, and coupling members of a bayonet coupling mounted to said base block and engaged with the coupling members of said detector unit.

2. A fire detector as claimed in claim 1, wherein said base block is circular, and said opening is an elongate hole extending radially in said base block.

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3. A fire detector as claimed in claim 2, wherein one end of said elongate hole in the radial direction of said base block is located inside of said outermost peripheral wall of the detector unit and the other end of said elongate hole in the radial direction is located outside of said outermost peripheral wall of the detector unit.

4. A fire detector as claimed in claim 3, wherein said piece of the locking spring extends substantially parallel to said elongate hole.

5. A fire detector as claimed in claim 1, wherein said engaging portion of the locking spring is a prismatic projection which extends from said piece of the locking spring, and said engaging portion of said detector unit defines a recess in which said projection is received.

6. A fire detector as claimed in claim 1, wherein said engaging portion of the locking spring defines a recess, and the engaging portion of said detector unit is a projection received in said recess.

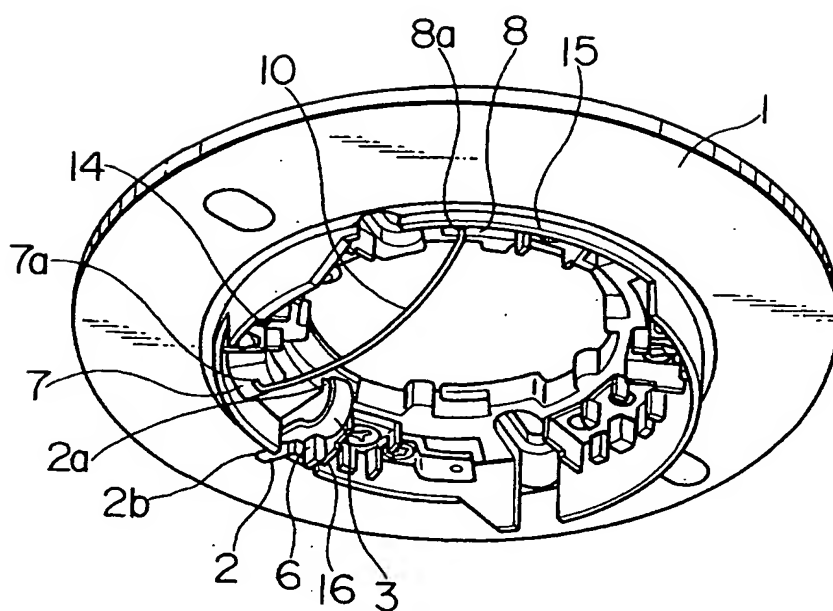
7. A fire detector as claimed in claim 1, wherein the entire portion of said locking spring that is located outside of said outermost peripheral wall of said detector unit is disposed within said hole in the base block of said detector base.



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FIG. 1

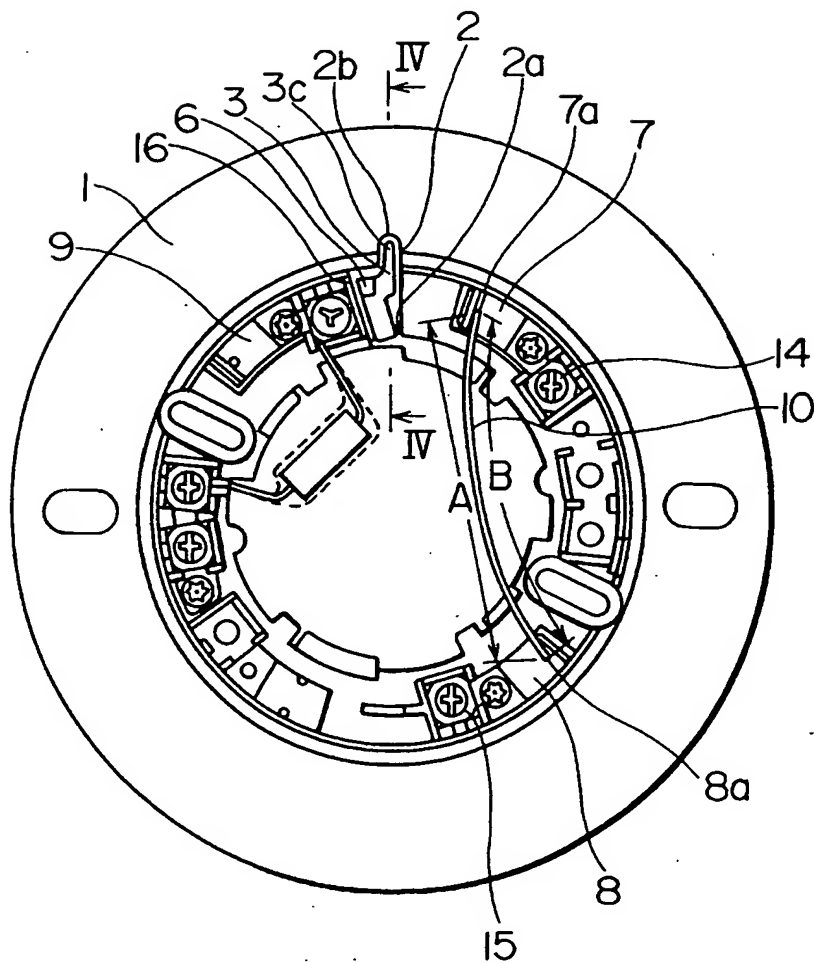


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FIG. 2

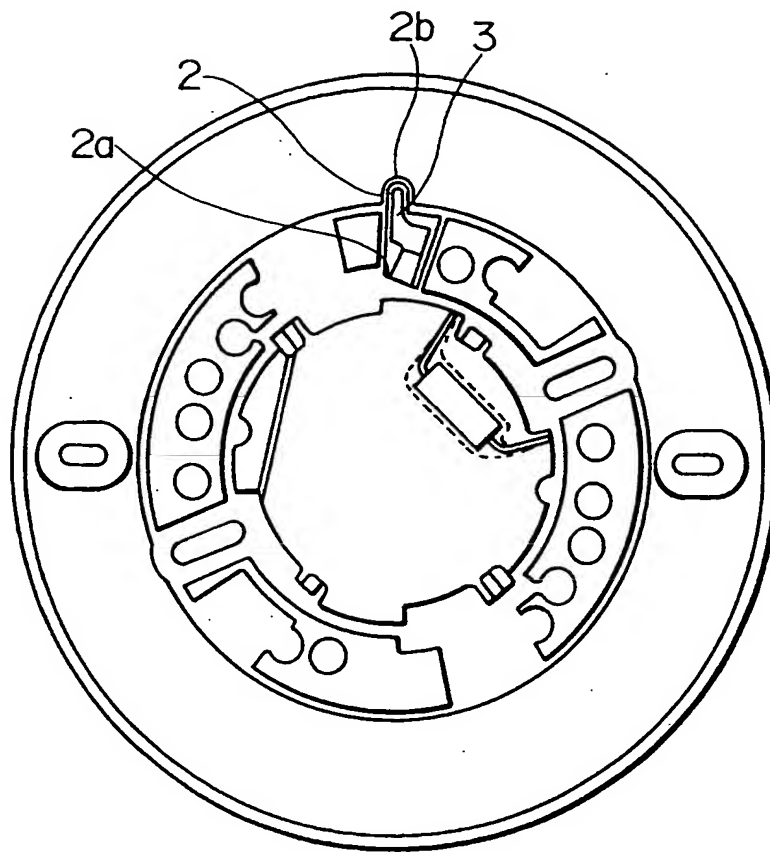


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FIG. 3



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FIG. 4

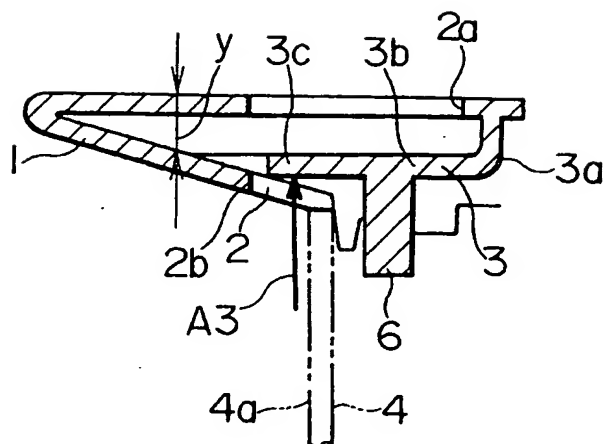
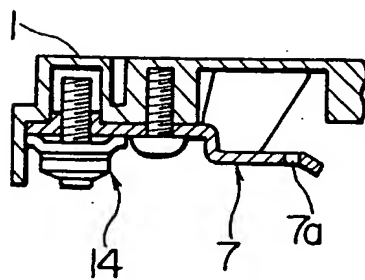


FIG. 5



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FIG. 6

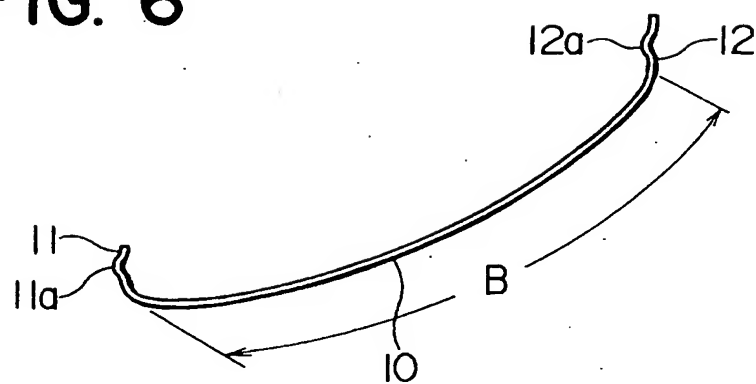


FIG. 7

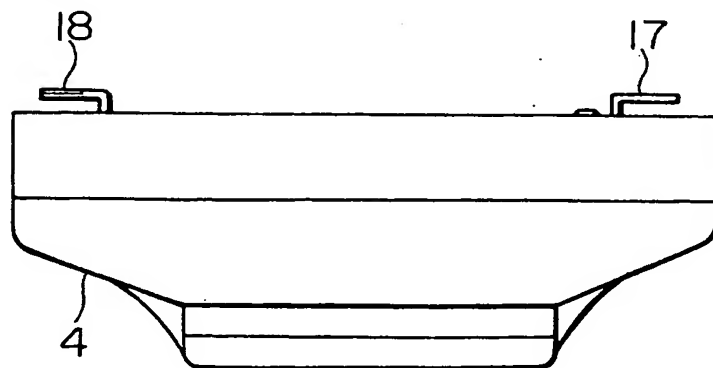
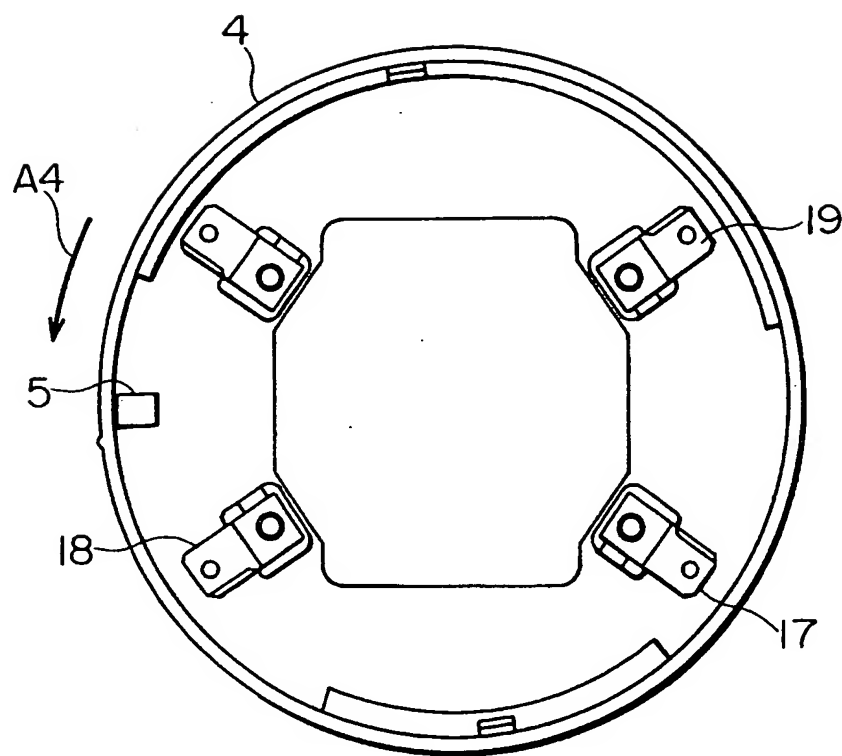


FIG. 8



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FIG. 9

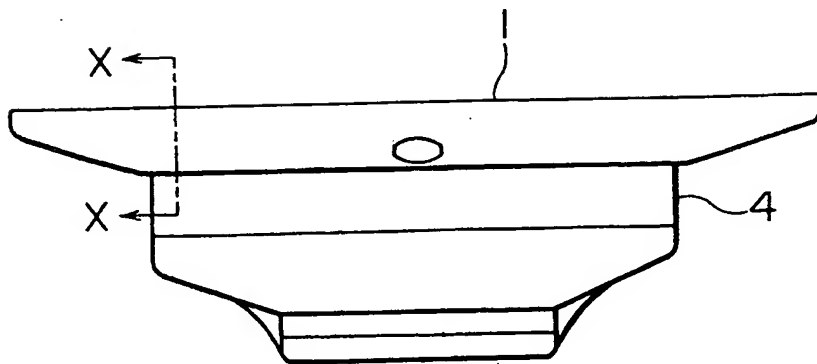
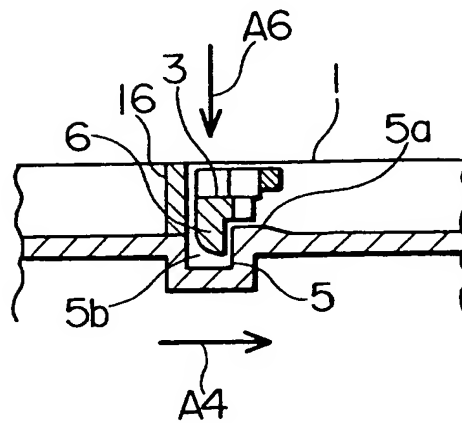


FIG. 10

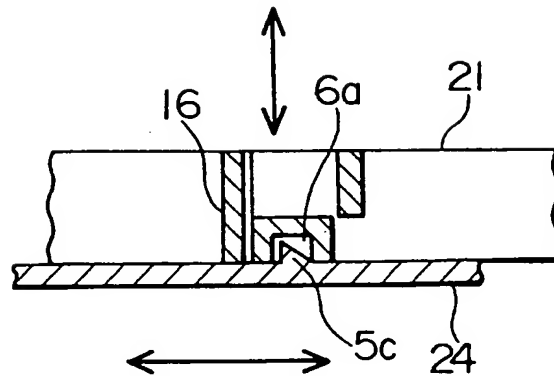


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FIG. 11



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